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SELF-EVALUATIONS OF SELECTED EXECUTIVE FUNCTIONS IN TWO AGE GROUP SAMPLES

Seminar paper

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Running head: Self-evaluation of executive functions

Tartu 2012

ABSTRACT

This study assesses the differences between self-evaluations of selected executive functions in two age group samples of both genders. Self-report measures of attention, control, self- esteem, anxiety, self- worth and action style were used to address this aims. This study confirmed that age significantly affects the scores of self-evaluations in almost all the fields of research. In addition, possible perspective of using current battery of measures in future studies is discussed.

Keywords: executive functions, aging, attention, control, self-esteem, anxiety, narcissism, psychopathy, impulsivity, sensation-seeking

KOKKUVÕTE

Täidesaatvate funktsioonide enesekohane hindamine kahe eagrupi valimitel

Käesolev uuring hindab erinevusi valitud täidesaatvate funktsioonide enesekohases hindamises kahe eagrupi valimitel mõlemast soost isikutel. Antud eesmärgi saavutamiseks kasutati uuringus enesekohaseid küsimustike, mis mõõdavad tähelepanu, kontrolli, enesehinnangut ja tegevusstiili. Tulemused kinnitavad, et vanus mõjutab oluliselt enesekohaseid hinnanguid peaaegu igas uuringu valdkonnas. Lisaks on arutletud käesolevas töös kasutatud küsimustike kasutamisvõimaluste üle tulevikus.

Märksõnad: täidesaatvad funktsioonid, vananemine, tähelepanu, kontroll, enesehinnang, ärevus, nartsissism, psühhopaatilisus, impulsiivsus, elamustejanu

INTRODUCTION

Many cognitive skills decline with age, but the magnitude of the age differences varies across functional domains (Horn, 1986). Executive functions are among the most age-sensitive cognitive skills (Hultsch et al., 1992; West, 1996). Functional brain imaging studies of executive control processes report robust differences in brain activity between older and younger subjects, particularly under conditions of high executive control demand (e.g., Grady et al., 1998; Jonides et al., 2000; Milham et al., 2002; Nielson et al., 2002; Postle et al., 1999; Reuter-Lorenz et al., 2000). These differences have been replicated across studies (see Park and Reuter-Lorenz, 2009; Reuter-Lorenz and Cappell, 2008 for reviews) and have generated several theoretical accounts of neurocognitive aging in the domain of executive functions.

Executive functioning constitutes a multi-faceted construct comprising a number of basic neurocognitive processes including working memory, cognitive flexibility, response selection, attention, inhibition, initiation, set formation, and set maintenance (Suchy, 2009). Together, these processes facilitate behaviors and choices that are adaptive, goal-directed, effortful, and controlled. Together, executive processes allow us to generate goals and plans, modify our behavior in response to changes in the environment, and follow through with executing necessary actions in order to successfully achieve the intended goals.

Executive functions can be regarded on the one hand as abilities, referring to those cognitive capacities such as inhibitory control, working memory, planning, and strategic thinking. All these abilities make behavioural self-regulation possible. On the other hand, some authors view executive functions more as the psychological processes involved in flexible and goal-directed problem-solving (Zelazo, Muller, Frye, & Marcovitch, 2003). Both views are compatible with the hypothesis that the executive functions are an essential component of perceiving control, or the feeling of control which goes along with intentional thinking (Wegner, 2002).

Understanding the perception and attribution of control has long been a major objective in psychology research, receiving much attention in diverse fields such as clinical psychology, cognitive neurosciences, child development, and the study of personality. Feeling in control is, along with our abstract intelligence and sociality, arguably one of our most human capacities, and forms an essential ingredient in a description of normal (or healthy) personality. Prakash R. S. et al., (2009) investigated the relative involvement of cortical regions supporting attentional control in older and younger adults during performance on a modified version of the Stroop task. Their results indicated that while younger adults demonstrated an increase in the activation of cortical regions responsible for maintaining attentional control in response to increased levels of conflict, such sensitivity and flexibility of the cortical regions to increased attentional control

demands was absent in older adults. These results suggest a limitation in older adults' capabilities for flexibly recruiting the attentional network in response to increasing attentional demands. According to this, we expect older individuals to have lower scores in attentional control subscales and higher scores in attention hindrances´ subscales.

Many psychological inflictions, ranging from depression or learned helplessness to addiction and psychoticism are inevitably accompanied by a sense of loss of control. Feelings of helplessness or loss of control are often accompanied by feelings of anxiety and/or depression (Declerck et al., 2002). Anxiety is an emotional state consisting of feeling tensed, apprehension, and nervousness (Spielberger et al., 1983). It can be differentiated into state anxiety and trait anxiety. State anxiety is a transitory emotional condition reflective of one's interpretation of a particular stressful situation at a particular period of time or feeling at a particular moment in time. Trait anxiety is the enduring of personality characteristic that refers to relatively stable individual differences that characterize people's anxiety or general feeling of anxiety (Spielberger et al., 1983). There is now a wealth of evidence to indicate that elevated levels of trait anxiety often are associated with impaired performance on a wide range of cognitive tasks (cf. Eysenck, 1982, 1988; Eysenck, Derakshan, Santos, & Calvo, 2007; Williams, Watts, MacLeod, & Mathews, 1997).

The leading approach to the influence of anxiety to human´s control is The Attentional Control Theory (ACT; Eysenck et al., 2007). Attentional control theory is an approach to anxiety and cognition representing a major development of Eysenck and Calvo's (1992) processing efficiency theory. It is assumed that anxiety impairs efficient functioning of the goal-directed attentional system and increases the extent to which processing is influenced by the stimulus-driven attentional system. In addition, attentional control theory assumes that anxiety impairs the efficiency of two types of attentional control: (1) negative attentional control (involved in inhibiting attention to task-irrelevant stimuli); and (2) positive attentional control (involved in flexibly switching attention between and within tasks to maximize performance). This theory assumes that anxiety increases the allocation of attentional resources to threat-related stimuli (e.g., internal worry), thereby reducing attentional focus on the current task. Studies on the anxiety and age have shown inconsistent results. Some authors have reported positive or negative linear or monotonic trends for anxiety (e.g., Herrmann, 1997; Lawton, Kleban, & Dean, 1993) or else stability across age (e.g., Fuentes & Cox, 2000; Nolen-Hoeksma & Ahrens, 2002). According to gender, women tend to report more anxiety than men and anxiety disorders are more prevalent among women (Becker et al, 2007). We expect females (especially older females) to have highest scores in all anxiety subscales.

The locus of control is a particular personality trait which measures the extent to which a person attributes control over the outcome of environmental events to oneself. People with an external locus of control also tend to be more reactive to negative events and express more negative affect (Boone, De Brabander, Gerits, & Willeme, 1990; Burger, 1984; Clarke, 2004; Glazer, Stetz, & Izso, 2004; Hahn, 2000; Hale & Cochran, 1987; Parkes, 1984). Whereas some studies have shown that an internal locus of control decreases in later life (Bradley & Webb, 1976; Brim, 1974; Lao, 1974; Lachman, 1983; Ryckman & Malikioski, 1975; Saltz & Magruder-Habib, 1982; Siegler & Gatz, 1985), an almost equal number have shown increases in internal control with aging (Gatz & Siegler, 1981; Lachman, 1985; Staats, 1974; Strickland & Shaffer, 1971; Wolk & Kurtz, 1975). Still other studies have found that locus of control remains stable throughout adulthood and old age (Andrisani, 1978; Bradley & Webb, 1976; Nehrke, Hulicka, & Morganti, 1980; Saltz & Magruder-Habib, 1982). The controversy of these findings makes examining the influence of age on the locus of control especially interesting.

Muris et al., (2008) found that self-report indexes of attention/effortful control were clearly negatively related to psychopathological symptoms, which provides support for the notion that low regulation is associated with higher levels of psychopathology. Among many other psychological disorders pathological functioning reveals its extremes in psychopathy. The personality characteristics of psychopathy include charisma, domineering egocentricity, as well as the indifferent and deliberate exploitation of others. The affective characteristics of psychopaths include anomalously shallow and unpredictable levels of emotion; insincere commitments to personal goals, interpersonal relationships, and societal principles; and deficiencies in guilt, empathy, and remorse. The behavioral characteristics of psychopathy include erratic, negligent, and sensation seeking activities that violate social and legal norms. Psychopathic individuals generally report less anxiety, exhibit decreased galvanic skin responses, and are less likely to learn to avoid an aversive stimulus (Blair, Jones, Clark,&Smith, 1997; Fowles&Missel, 1994; Hare, 1965, 1978, 1982; Hare & Quinn, 1971; Levenston, Patrick, Bradley, & Lang, 2000: Lykken, 1957; Patrick, Cuthbert, & Lang, 1994;Waid & Orne, 1982). Certain psychopathic qualities (emotional detachment) may be more associated with somatic and trait anxiety than other characteristics (like deviant behavior), although anxiety did not moderate the effects of psychopathic characteristics on physiological responding (Bare et al., 2004).

According to Hare´s theory, there are two factors of psychopathy (Hare's Psychopathy Checklist-Revised; PCL-R; Hare, Harpur, & Hakstian, 1990). Here, Factor 1 reflects the interpersonal (charm, grandiosity, and deceitfulness/conning) and affective (lack of remorse, empathy, and emotional depth) features of psychopathy. Alternatively, Factor 2 describes the impulsive and chronic antisocial tendencies associated with psychopathy. The impulsive and

antisocial symptoms of psychopathy (i.e., PCL-R Factor 2), however, have been attributed to a deficit in executive control that undermines inhibition of behavior (Patrick, 1994). For Patrick (2007), the impulsive and antisocial behaviors associated with Factor 2 reflect a deficit in higher-order processes that interfere with one's focus on threat cues, precludes activation of the defensive system, undermines inhibition of approach behavior, and indirectly results in weak defensive system functioning. Additionally, in contrast to Factor 1, Factor 2 is positively associated with trait anxiety (Patrick, 2007). Huchzermeier et al., (2008) found that Factor 2 is negatively correlated with age, while Factor 1 was not related to age. Jonason et al., (2010) found that both psychopathy and Machiavellianism were correlated with low self-control, a tendency to discount future consequences, and high rates of attention deficit disorder. Narcissism was not correlated with measures of self-control in either study.

The majority of studies of narcissism have been carried out with young adults. Little is known about narcissism in older age, and there have been no longitudinal published studies examining the development of narcissism from early adulthood to older age. Roberts, Edmonds, and Grijalva (2010) suggested that narcissism should decrease with age, since the narcissistic characteristic of not making commitments to others runs counter to normative pathways. Supporting this, a large scale, cross-sectional study of NPI narcissism found a steady decrease in narcissism between age 15 and 54, with a small increase after age 55 (Foster, Misra, & Reidy, 2009). Considering sex differences in narcissism, it was concluded that men are more prone to narcissism than women (Wright et al., 1989). According to previous findings we expect young men to have highest scores in narcissism subscales in comparison with other groups.

Self-esteem is a sociopsychological construct that assesses an individual's attitudes and perceptions of self-worth. Thus, self-esteem is ''an understanding of one's quality as an object — that is, how good or bad, valuable or worthless, positive or negative, or superior or inferior one is'' (Thoits, 1999, p. 342). Individuals with low self-esteem are highly attentive to information conveying rejection, whereas those with high self-esteem appear to inhibit their attention to this sort of information (Dandeneau & Baldwin, 2004, 2009). That is, individuals with low self-esteem have been found to differ from those with high self-esteem in terms of their pattern of selective attention such that they are especially attentive to evaluative threats as shown in previous studies using the Emotional Stroop task (Dandeneau & Baldwin, 2004) and a visual probe task (Dandeneau & Baldwin, 2009). According to this we will hypothesize that people with low self-esteem would obtain smaller scores in attentional control and higher scores in attention hindrances. Only a handful of cross-sectional studies have explored the relationship between age and self-esteem into old age, and these studies have produced mixed results. Some show that self-esteem remains stable or increases as individuals age, others suggest that it

decreases, and still others demonstrate that there is a curvilinear relationship between age and self-esteem (for an overview, see Giarrusso, Mabry, & Bengtson, 2001). Two explanations for the relationship between self-esteem and aging have been put forth. The maturation perspective suggests that as individuals age, they become more accepting of who they are. Hence, developmental approaches to the study of aging and self-esteem would predict stable or increasing levels of self-esteem in later life. Role perspectives have also been used to explain the relationship between aging and self-esteem. According to role perspectives, the loss of social roles that is associated with old age will result in lower levels of self-esteem. Thus, the role perspective argues that as people retire and disengage from active parenting, their self-esteem will suffer (Dietz, 1996). According to Estonian population, Pullmann and Allik (2000) and Pullmann, Allik, & Realo, (2009) found that self-esteem of Estonians appears to be rather stable, influenced neither by gender nor age. McMullin et al., (2004) showed that, contrary to some past research, suggesting that age has little influence on self-esteem or that self-esteem increases with age, levels of self-esteem are lower in older age groups for both men and women. Furthermore, in all age groups, women have lower levels of self-esteem than do men.
According to these findings we expect older females to have highest scores in negative self-esteem scale.

Impulsivity is often defined as ‘a predisposition toward rapid, unplanned reactions to internal or external stimuli without regard to negative consequences of these reactions to themselves or others’ (Moeller, Barratt, Dougherty, Schmitz, & Swann, 2001). Within the behavioural analysis domain, it is believed that impulsive individuals show deficient tolerance of delay of gratification or have difficulty in delaying or inhibiting voluntary responding (Logue, 1995; Ho, Mobini, Chiang, Bradshaw, & Szabadi, 1999). Enticott et al., (2006) have found that higher scores in self-reported impulsivity were negatively correlated with negative attentional control (inhibiting attention to task-irrelevant stimuli). Impulsivity has also been found to be negatively associated with age across childhood, adolescence, and early adulthood (Galvan, Hare, Voss, Glover, & Casey, 2007; Leshem & Glicksohn, 2007). In contrast, sensation seeking has been found to be positively associated with age (Russo et al., 1991, 1993; Stephenson, Hoyle, Palmgreen, & Slater, 2003) among early adolescents but negatively associated with age in adult samples (Giambra, Camp, & Grodsky, 1992; Roth, Schumacher, & Brahler, 2005; Zuckerman, Eysenck, & Eysenck, 1978). There are lots of articles examining the changes of impulsivity and sensation-seeking during adolescence and early adulthood, but the data on impulsivity and older adulthood is surprisingly limited. Also relatively little is known about the role of sex in impulsivity. Studies with rats have shown that in adult rodents, males

show more impulsive action than females (Jentsch et al., 2003). According to the previous findings we would hypothesize that younger men obtain highest scores in impulsivity and sensation-seeking subscales.

Based on previous research and theoretical considerations the following hypotheses were formed:

Hypothesis 1: Older individuals of both genders would have lower scores in attentional control subscale and higher scores in attention hindrances´ subscales.

Hypothesis 2: Older females would obtain higher scores than individuals of other groups in negative self-esteem scale.

Hypothesis 3: Younger males would obtain higher scores in narcissism subscales in comparison with other groups.

Hypothesis 4: Older females would show higher scores than all other groups in all anxiety subscales.

Hypothesis 5: Younger males would score higher in impulsivity and sensation-seeking subscales than other groups´ participants.

METHOD

To address these aims, we administered self-report measures of attention, control, self- esteem, anxiety, self- worth and action style to a sample of older and younger adults of both genders.

Participants

In our study we had male and female participants in two age groups: 1) 53 younger males, 2) 17 younger females, 3) 25 older males and 4) 37 older females. Both younger males and females were students of Estonian Aviation Academy. Older adults were of different educational levels, recruited by the author of the study as a convenience sample. All participants were fluent in Estonian. The age characteristics of participants by groups are given in the Table 1.

Table 1. Age characteristics of participants

Age and gender samples	*N*	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1 (M)	53	21,91	1,713	,235	21,43	22,38	20	27
2 (F)	17	21,53	1,328	,322	20,85	22,21	20	24
3 (M)	25	57,40	9,247	1,849	53,58	61,22	40	72
4 (F)	37	55,30	8,117	1,334	52,59	58,00	41	74
Total	132	37,94	18,207	1,585	34,80	41,07	20	74

Note: F – females; M - males

Procedure

The printed questionnaires were handed out to the persons who agreed to participate in the study. The questionnaires were provided with written instructions and additional minor suggestions were orally given by the author of the present study. In the older age group the participants were given the complete package of questionnaires to fill in at home. Although there was no time limit for filling in the questionnaires, the participants were instructed to bring questionnaires back as soon as possible. On the day the participants returned the questionnaires, they were debriefed and thanked. In younger age group the participants filled in the questionnaires during the dedicated time in their study process. It took about 30 – 35 minutes to fill in all the questionnaires in the package.

Measures

The measures used in our research were adapted and put together by Aavo Luuk, the supervisor of the author of the present paper and are at the stage of approbation.

Attention scale

The attention scale used in our questionnaire is based on the The Attentional Control Scale (ACS, Derryberry & Reed, 2002; Verwoerd, de Jong, & Wessel, 2006). Differently from Attentional Control Scale, which measures attentional focus (the ability to focus attention), attentional shift (the ability to shift attention between tasks), and thought control (the ability to flexibly control thought), our attention scale consists of following subscales: attention internal hindrances subscale (5 items; Cronbach's α 0,740), attention external hindrances subscale (5 items; Cronbach's α 0,706) and attention control subscale (5 items; Cronbach's α 0,700). The attention internal hindrances´ subscale is supposed to measure the influence of bothering factors inherent to the person (e.g. doubt, fear, confusion, anger, anxiety, depression etc.) on her/his attention. The attention external hindrances´ subscale is supposed to measure the influence of bothering factors coming from outside of the person (e.g. noise, music etc.) on her/ his attention. The attention control scale is supposed to measure individual´s ability to voluntary control his/her attention. The items are scored on a 5-point Likert-scale, ranging from 0 (wrong/strongly disagree) to 4 (right/strongly agree).

Control scale

The control scale also consists of three subscales, the first being the attention control subscale (5 items; Cronbach's α 0,700), described above. Its repeated use under the control scale could be

expedient if the summary control scores were calculated by summing up the results of all three subscales related to control. This opportunity was not used in the present study. Other two subscales are the external locus of control subscale (5 items; Cronbach's α 0,735) and the planning-type of control subscale (5 items; Cronbach's α 0,700). The external locus of control subscale is based on ´´The Locus of Control Theory´´ (Rotter, 1966). The locus of control is a particular personality trait which measures the extent to which a person attributes control over the outcome of environmental events to one-self. A person is said to have an internal locus of control if he or she generally believes that a reinforcing event is contingent upon his or her own behavior. At the other end of the continuum, a person is said to have an external locus of control if he or she does not perceive any contingency between a reinforcing event and personal action, but instead attributes the event to luck, chance, fate, or powerful others, or simply labels the event as unpredictable. Instead of the expected internal locus of control subscale, the planning-type of control subscale emerged from exploratory factor analysis and it is supposed to measure the individual´s ability to plan his/her actions according to situation. The items of the scale are scored on a 5-point Likert-scale, ranging from 0 (wrong/strongly disagree) to 4 (right/strongly agree).

Negative self-esteem and responsibility scales

The negative self-esteem scale is based on The Rosenberg´s Self-Esteem Scale (RSES; Rosenberg, 1965, Pullmann, Allik, 2000, Pullmann, Allik, & Realo, 2009). Several researchers who conducted factor analyses of the 10-item Rosenberg Scale have suggested that the scale reflects a two-dimensional construct, comprised of positive and negative images of the self (Bachman & O'Malley, 1986; Goldsmith, 1986; Kaplan & Pokorny, 1969; Owens, 1993). From the initial item pool used in preparing the scales applied in the present study, a negative self-esteem scale (10 items; Cronbach's α 0,842) emerged together with a scale preliminarily named as responsibility scale (11 items; Cronbach's α 0,819). The items are scored on a 5-point Likert-scale, ranging from 0 (wrong/strongly disagree) to 4 (right/strongly agree).

The dark facets of personality

The scale of the dark facets of personality is based on The Dark Triad´s theory. The Dark Triad is composed of Machiavellianism, subclinical narcissism and subclinical psychopathy. Machiavellian individuals tend to be manipulative, while demonstrating a 'cool' or 'cold' approach to others (Christie & Geis, 1970; Hunter, Gerbing, & Boster, 1982). Subclinical narcissists, sometimes called 'normal narcissists' (Sedikides, Rudich, Gregg, Kumashiro, & Rusbult, 2004), tend to have a sense of entitlement and seek admiration, attention, prestige and

status (House & Howell, 1992; Morf & Rhodewalt, 2001; Raskin & Hall, 1979). Subclinical psychopaths are characterised by high impulsivity and thrill-seeking and tend to have low empathy (Paulhus, Hemphill, & Hare, in press). In our questionnaire we have two subscales – psychopathy subscale (11 items, Cronbach's α 0,750) and narcissism subscale (4 items, Cronbach's α 0,710). Although a comprehensive set of appropriate statements were used on initial sample, the Machiavellianism factor did not emerge from exploratory factor analysis. The items of the psychopathy subscale come from the 31-item self-report psychopathy scale-III (SRP-III; Paulhus, Neumann, & Hare, in press) and the items of the narcissism subscale are based on the 40-item Narcissistic personality inventory (NPI-40; Raskin & Terry, 1988). The items are scored on a 5-point Likert-scale, ranging from 0 (wrong/strongly disagree) to 4 (right/strongly agree).

Visual Analogue Scale for Anxiety

Visual Analogue Scale for Anxiety (VAAS) consists of a 10-cm horizontal line, anchored on the left by the words ''zero anxiety'' and on the right by ''maximal anxiety.'' Participants were provided with written instructions on how to evaluate their anxiety by marking the line with a vertical stroke to show how anxious they feel at the moment. A mark at the extreme left would show that the person was feeling not at all anxious at the moment. A mark at the extreme right would show that the person was feeling extremely anxious at the moment. A mark near the centre would show that the person was feeling moderately anxious. The Visual Analogue Scale of Anxiety (VAAS) has been used in several studies to measure the degree of anxiety in anxiety disorder patients and healthy subjects. It has proven to be a valid method for the measurement of anxiety and is highly sensitive for change (Hornblow and Kidson, 1976).

State anxiety scale

To measure state anxiety, the adapted State Version of State-Trait Inventory for Cognitive and Somatic Anxiety (Ree et al., 2000) was used. The scale has 21 items (Cronbach's α 0,923) together on two subscales of somatic component of anxiety (arousal) and cognitive component of anxiety (worry). The items are scored on a 5-point Likert-scale, ranging from 0 (wrong/strongly disagree) to 4 (right/strongly agree).

Frequency of anxiety episodes (Trait anxiety) scale

To measure trait anxiety we used adopted Trait Version of State-Trait Inventory for Cognitive and Somatic Anxiety (Ree et al., 2000). The scale has 21 items (Cronbach's α 0,925), which are identical to the items of the State Version of the scale with two subscales of somatic component of anxiety (arousal) and cognitive component of anxiety (worry). The items are scored by

frequency of occurrence on a 5-point Likert-scale, ranging from 0 (almost never) to 4 (almost everytime).

Narcissism scale

The narcissism scale used in our research bases on the Pathological Narcissism Inventory (PNI, Pincus et al., 2009). The PNI is a 52-item self-report measure assessing 7 dimensions of pathological narcissism spanning problems with narcissistic grandiosity (Entitlement Rage, Exploitativeness, Grandiose Fantasy, Self-sacrificing Self-enhancement) and narcissistic vulnerability (Contingent Self-esteem, Hiding the Self, Devaluing). Using factor analysis the following subscales of modified narcissism scale were formed: disappointment of people not fulfilling expectations put onto them (5 items; Cronbach's α 0,783), sensitivity to catching other´s attention (5 items; Cronbach's α 0,791), egotripping benevolency (5 items; Cronbach's α 0,803) and manipulating people (5 items; Cronbach's α 0,665). The items are scored on a 5-point Likert-scale, ranging from 0 (wrong/strongly disagree) to 4 (right/strongly agree). After gathering the decent amount of respondents the new analysis is planned to consider joining the subscale of narcissism introduced above under the heading *The dark facets of personality* with the present narcissism measure.

Impulsivity

To measure impulsivity the adapted version of UPPS-P was used. UPPS-P is a revised version of the UPPS Impulsive Behavior scale (Whiteside & Lynam, 2001). This version assesses an additional personality pathway to impulsive behavior, Positive Urgency (Cyders & Smith, 2007), in addition to the four pathways assessed in the original version of the scale- Urgency (now Negative Urgency), (lack of) Premeditation, (lack of) Perseverance, and Sensation Seeking. In our impulsivity scale we have six factors: positive urgency - the tendency to act rashly while in a positive mood (4 items; Cronbach's α 0,872), premediation - the ability/inability to anticipate the future consequences of actions (4 items; Cronbach's α 0,869), sensation-seeking - the experience of positive feelings towards risky actions (4 items; Cronbach's α 0,805), perseverance - the ability/inability to follow through on a task (4 items; Cronbach's α 0,852), negative urgency - the tendency to act rashly while in a negative mood (4 items; Cronbach's α 0,694) and The Roth´s sensation-seeking (4 items; Cronbach's α 0,725), subscale which bases on The Need Inventory of Sensation Seeking (NISS; Roth, Hammelstein, & Brahler, 2007). The items are scored on a 5-point Likert-scale, ranging from 0 (wrong/strongly disagree) to 4 (right/strongly agree).

Statistical analysis

Statistical analysis was performed using the program SPSS 16.0. One-way ANOVA was

used to test for differences between group means.

RESULTS

The aim of the study was to compare younger and older adults of both genders by their scores in attention, control, anxiety, self-esteem, self- worth and action style using self-reported questionnaires. One-way ANOVA was used to test for significant differences between group means by analyzing the variances. According to statistical analysis the two age groups of participants in four age and gender samples were statistically different in term of age between groups (Table 2).

Tabel 2. One-way ANOVA on age differences between younger and older males and females

		Sum of Squares	*df*	Mean Square	*F*	*p*
Age	Between Groups	38819,022	3	12939,674	359,709	,000
	Within Groups	4604,493	128	35,973		
	Total	43423,515	131			

After One-way ANOVA the Scheffe Post Hoc test was carried out to prove that there are statistically significant differences between groups in all subscales measuring attention (internal attention hindrance subscale ATT_1, external attention hindrances subscale ATT_2, attention control subscale ATT_3). Also there are statistically significant differences in two subscales measuring control (attention control subscale ATT_3 mentioned above and the external locus of control subscale CTRL_1). Of the negative self-esteem and responsibility subscales, only the negative self-esteem (EHI_1) scale showed statistically significant differences between groups. Considering the dark facets of human´s personality, narcissism subscale (EHI_4), but not psychopathy subscale showed statistically significant differences between age groups. Three out of four narcissism subscales also showed between-group differences (disappointment of people not fulfilling expectations put onto them subscale NA1, sensitivity to catching other´s attention subscale NA2 and manipulation subscale NA4). Visual Analogue Scale of Anxiety didn´t show significant differences, but both state and trait anxiety subscales (StaAnx, AnxFrq) did. Of the impulsivity subscales, the sensation seeking subscale (SensU), Roth sensation-seeking subscale (SensR) and negative urgency subscale (N_urg) showed statistically significant differences between groups (Table 3).

Table 3. Statistically significant multiple comparisons in mean differences determined by the Scheffe Post Hoc test of One-way ANOVA

Dependent Variable	Group (I)	Group (J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
ATT_1	1	3	-4,331*	,832	,000	-6,69	-1,97
	1	4	-3,896*	,734	,000	-5,98	-1,82
ATT_2	1	3	-3,397*	,924	,005	-6,01	-,78
	1	4	-3,339*	,816	,001	-5,65	-1,03
ATT_3	1	3	2,326*	,757	,027	,18	4,47
	1	4	2,377*	,668	,007	,48	4,27
CTRL_1	1	3	-5,857*	,918	,000	-8,46	-3,26
	1	4	-7,431*	,811	,000	-9,73	-5,13
	2	4	-4,760*	1,109	,001	-7,90	-1,62
	3	1	5,857*	,918	,000	3,26	8,46
EHI_1	1	3	-5,865*	1,535	,003	-10,21	-1,52
	1	4	-5,044*	1,356	,004	-8,88	-1,20
	3	1	5,865*	1,535	,003	1,52	10,21
EHI_4	1	4	2,994*	,676	,000	1,08	4,91
	2	4	3,448*	,925	,004	,83	6,07
	3	4	3,119*	,817	,003	,80	5,43
NA1	1	3	-3,798*	,830	,000	-6,15	-1,45
	1	4	-3,088*	,733	,001	-5,16	-1,01
NA2	1	3	-3,719*	1,046	,007	-6,68	-,75
NA4	1	4	2,601*	,712	,005	,58	4,62
StaAnx	1	3	-15,131*	3,062	,000	-23,81	-6,45
	1	4	-15,599*	2,704	,000	-23,26	-7,94
	2	3	-12,287*	3,968	,026	-23,53	-1,05
	2	4	-12,755*	3,698	,010	-23,23	-2,28
AnxFrq	1	3	-10,497*	2,935	,007	-18,81	-2,18
	1	4	-12,810*	2,592	,000	-20,15	-5,47
SensU	1	3	2,814*	,891	,022	,29	5,34
	1	4	5,353*	,801	,000	3,08	7,63
	2	4	3,326*	1,059	,023	,32	6,33
SensR	1	3	3,301*	,703	,000	1,31	5,30
	1	4	3,381*	,632	,000	1,59	5,17
N_urg	1	3	-1,925	,680	,051	-3,85	,00
	1	4	-1,960*	,611	,020	-3,70	-,23

*. The mean difference is significant at least at the 0.05 level.

Descriptive data of measures used by age and gender groups are given in the table in APPENDIX 1.

Results by measures

Attention subscales

Considering the subscales of attention, as was predicted, younger men report less internal and external attention hindrances and more attentional control than older men and older women. There were no significant differences in self-reported attention between younger women and the other groups.

Control subscales

Younger men have significantly smaller scores in external control scale in comparison with older men and women. Younger women differ significantly only from older women, but not older men. These results show that younger people generally believe they control consequences and attribute the events in their lives to personal skills and efforts, while older people attribute consequences and events to external factors, such as luck, divinity, powerful people, or uncontrollable powers. Responses on the planning type of control subscale did not reveal differences between age and gender groups.

Negative self-esteem

Younger men have smaller scores in negative self-esteem scale than older men and women. Younger women didn´t show significant differences with other groups. Although we predicted older women to obtain highest scores in negative self-esteem scale, they didn´t show statistically significant differences in means with older males´ group. The scores of older males on negative self-esteem were numerically even higher.

Psychopathy and narcissism subscales

There were no differences between groups on the subscale of psychopathy, but on the subscale of narcissism older women score lower in comparison with other groups. The results of other three groups are quite the same on narcissism subscale.

Narcissism questionnaire

Looking at the four subscales of narcissism questionnaire, we see that younger males tend to report more manipulation with people than the other groups, showing greater difference with the group of older females. On the scale of disappointment in people not fulfilling expectations put

onto them, younger males show lower scores than both older males and females. Sensitivity to catching other´s attention is higher in older males in comparison with younger males. Subscales of narcissism questionnaire have shown very uneven results between groups. Summed scores of all four narcissism subscales didn´t reveal statistically significant differences between groups.

Anxiety

The scores of both state and trait anxiety of younger males were significantly lower in comparison with other groups, especially with older adults. As predicted below, older females obtained highest scores in anxiety subscales, although the differences were statistically significant only in comparison with younger males. Differences in means of the Visual Analogue Scale for Anxiety weren´t statistically significant.

Impulsivity questionnaire subscales

As expected, younger males showed highest scores on both sensation-seeking scales. The differences are the greatest in comparison with older adults, both males and females. Older females report less sensation seeking than all other groups. Younger males show lower scores in negative urgency than the other groups, differing significantly from older females. The significance in difference between older and younger males is a borderline case. This hypothesis was only partially proven, due to the unexpected finding that older women reported high negative urgency (the tendency to act rashly while in a negative mood).

DISCUSSION

The current study examined the differences between younger and older adults of both genders in terms of attention, control, self-esteem, self-worth (narcissism) and action style (impulsivity) using self-reported questionnaires. Age effects are of interest because, although many studies have shown age-related differences in these fields of research, there is conflicting evidence as to their typical trajectory across the adult life span. Sex differences on this field of research have also shown controversy results, which makes it interesting to consider both age and gender while examining executive functions. Executive functioning have been studied mainly by using objective measures (neuropsychological testing), while subjective (self-reported) measuring is not very common in this field of research. Also using current battery of self-reported measures is a new approach, which can be used in future together with neuropsychological testing to measure individuals´ executive functioning in a more effective way.

As our results show, there are significant differences between younger and older adults in almost all the measures used in our study. The sample of younger males forms the unique group with their results differing from the data of other groups considerably. At the same time the group of younger females do not show much differences compared to older individuals.

There could be two explanations to this fact. Firstly, the group of younger females could be less representative because of the smaller number of individuals. If there were more participants in this group, the results would probably be different and more differences between young females and other groups would be detected. Secondly, the group of younger males is biased in the sense that it contains a considerable proportion of individuals with high cognitive skills due to the passed selection procedures to become pilots and air traffic controllers. There are some such individuals also in the younger female group, but the prevalence of such females is much lower in their respective group. In selection procedures to pilots and air traffic controllers, as a rule, the students admitted have shown good results in objective testing of executive functioning. If to exclude these individuals from the younger males´ group, the results would probably be different.

The results confirmed Hypothesis 1 partially. We hypothesized that both younger males and females will report higher scores in attention control and lower scores in attention hindrances, but statistically significant differences in means were revealed only between younger males and older adults. This can be also due to the smaller number of participants in the younger female group.

Hypothesis 2 was also confirmed partially. The results showed that negative self-esteem declines with age, but older females differed significantly only from younger males.

Hypothesis 3 was not confirmed. Summed scores of all four narcissism subscales didn´t reveal statistically significant differences between groups.

Hypothesis 4 was comfirmed. Although older females´ results on anxiety differed significantly only from younger males, there were small differences with other groups. If there were more participants in the younger female group, the results would probably be more obvious.

Hypothesis 5 was also partially confirmed. As expected, younger males demonstrated highest scores in sensation-seeking subscales but not in other impulsivity subscales. Unexpectedly older females obtained high scores in negative urgency, but the possible explanation to this fact could not be found in scientific literature.

There are also several limitations to the findings of this study. Two of them have been discussed above. The first limitation is the small number of individuals of the younger female group and that is why the results should be replicated on a larger sample of participants. Second limitation is that we couldn´t expect the sample of younger males to be so different from the other groups. Obviously existing results should be compared with the results in condition, when a sample of young males with highest objective executive function scores will be separated from others in the course of the analysis. Third limitation is the heterogenity of the participants´ levels of education in both older adult groups due to using convenience sample, while younger adults are highly homogeneous on this feature.

This result calls for further studies of self-evaluation of executive and cognitive functions in samples, where objective measures of cognitive abilities, and especially attention-related function measures are also available.

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APPENDIX 1

Descriptives of measures used in the study by age and gender groups

Measure	Group	*N*	Mean	Std. Deviation	Std. Error	95% Conf. Interval for Mean		Mini-mum	Maxi-mum
						Lower Bound	Upper Bound		
ATT_1	1	53	5,51	2,998	,412	4,68	6,34	0	11
	2	17	6,82	3,206	,778	5,18	8,47	2	13
	3	25	9,84	3,944	,789	8,21	11,47	3	20
	4	37	9,41	3,723	,612	8,16	10,65	0	20
	Total	132	7,59	3,899	,339	6,92	8,26	0	20
ATT_2	1	53	8,28	3,934	,540	7,20	9,37	1	15
	2	17	9,12	3,160	,766	7,49	10,74	4	17
	3	25	11,68	4,356	,871	9,88	13,48	3	20
	4	37	11,62	3,483	,573	10,46	12,78	4	20
	Total	132	9,97	4,092	,356	9,27	10,67	1	20
ATT_3	1	53	14,57	2,984	,410	13,74	15,39	7	20
	2	17	12,65	2,737	,664	11,24	14,05	6	17
	3	25	12,24	2,634	,527	11,15	13,33	7	18
	4	37	12,19	3,711	,610	10,95	13,43	3	20
	Total	132	13,21	3,281	,286	12,65	13,78	3	20
CTRL_1	1	53	3,62	3,353	,461	2,70	4,55	0	12
	2	17	6,29	3,098	,751	4,70	7,89	1	12
	3	25	9,48	3,991	,798	7,83	11,13	3	16
	4	37	11,05	4,453	,732	9,57	12,54	2	20
	Total	132	7,16	4,947	,431	6,31	8,01	0	20
EHI_1	1	53	9,42	5,665	,778	7,85	10,98	0	21

	2	17	11,47	5,352	1,298	8,72	14,22	1	23
	3	25	15,28	7,651	1,530	12,12	18,44	0	33
	4	37	14,46	6,652	1,094	12,24	16,68	1	27
	Total	132	12,20	6,752	,588	11,04	13,37	0	33
EHI_4	1	53	10,08	2,779	,382	9,31	10,84	4	16
	2	17	10,53	2,552	,619	9,22	11,84	6	15
	3	25	10,20	3,524	,705	8,75	11,65	5	16
	4	37	7,08	3,616	,594	5,88	8,29	0	16
	Total	132	9,32	3,423	,298	8,73	9,91	0	16
NA1	1	53	4,64	2,890	,397	3,85	5,44	0	12
	2	17	5,88	3,352	,813	4,16	7,61	0	11
	3	25	8,44	3,938	,788	6,81	10,07	1	18
	4	37	7,73	3,769	,620	6,47	8,99	1	19
	Total	132	6,39	3,743	,326	5,74	7,03	0	19
NA2	1	53	4,32	3,636	,499	3,32	5,32	0	16
	2	17	6,71	5,599	1,358	3,83	9,58	0	17
	3	25	8,04	4,420	,884	6,22	9,86	0	20
	4	37	6,35	4,480	,736	4,86	7,84	0	20
	Total	132	5,90	4,494	,391	5,13	6,68	0	20
NA4	1	53	11,55	2,965	,407	10,73	12,36	5	18
	2	17	9,29	3,177	,771	7,66	10,93	4	16
	3	25	9,92	3,402	,680	8,52	11,32	4	16
	4	37	8,95	3,793	,624	7,68	10,21	2	16
	Total	132	10,22	3,478	,303	9,62	10,82	2	18
StaAnx	1	53	7,51	8,941	1,228	5,04	9,97	0	32
	2	17	10,35	9,585	2,325	5,42	15,28	0	31
	3	25	22,64	17,049	3,410	15,60	29,68	0	62
	4	37	23,11	14,710	2,418	18,20	28,01	0	56
	Total	132	15,11	14,521	1,264	12,61	17,61	0	62
AnxFrq	1	53	10,62	8,953	1,230	8,15	13,09	0	33
	2	17	16,29	11,477	2,784	10,39	22,20	1	42
	3	25	21,12	14,976	2,995	14,94	27,30	3	61
	4	37	23,43	14,021	2,305	18,76	28,11	0	58
	Total	132	16,93	13,208	1,150	14,66	19,21	0	61
SensU	1	42	11,21	3,496	,539	10,12	12,30	3	16
	2	16	9,19	3,582	,895	7,28	11,10	4	15
	3	25	8,40	3,266	,653	7,05	9,75	1	13
	4	36	5,86	3,704	,617	4,61	7,11	0	16
	Total	119	8,73	4,108	,377	7,99	9,48	0	16
SensR	1	42	12,38	2,498	,385	11,60	13,16	6	16
	2	16	11,19	2,810	,702	9,69	12,68	4	15
	3	25	9,08	2,957	,591	7,86	10,30	4	16
	4	36	9,00	2,957	,493	8,00	10,00	1	14
	Total	119	10,50	3,159	,290	9,93	11,08	1	16
N_urg	1	42	5,60	2,198	,339	4,91	6,28	1	11
	2	16	6,00	2,875	,719	4,47	7,53	1	12
	3	25	7,52	2,238	,448	6,60	8,44	4	12
	4	36	7,56	3,342	,557	6,42	8,69	0	16
	Total	119	6,65	2,815	,258	6,14	7,16	0	16

Käesolevaga kinnitan, et olen korrektselt viidanud kõigile oma töös kasutatud teiste autorite poolt loodud kirjalikele töödele, lausetele, mõtetele, ideedele või andmetele.

Olen nõus oma töö avaldamisega Tartu Ülikooli digittaalarhiivis DSpace.

Anna Tkatšuk